

ESMT Elite Semiconductor Microelectronics Technology Inc.

Audio / Power Product BU



Company Highlights

- Taiwan-Based IC Design Company
- Established : Aug, 1997
- Public Listed in Taiwan Stock Exchange : March 2002
- Collected Capital : US\$ 95M
- Revenue in 2020 : US\$ 545M
- Scope : Specialty Memory (BU1), Audio/Power IC (BU2)
- Number of Employees : 460 (69 for BU2)
- Location : Hsinchu Science Park, Taiwan

Rank 5th of TWN Listed IC Design Houses

Rank	Company	Stock ID	2020 Rev (K NTD)	Note
1	MTK	2425	322,145,988	Mobile Phone, TV, DVD
2	Novatek	3034	79,955,521	LCD Driver, LCD TV SOC
3	Realtek	2379	77,759,469	Network Communications, PC Peripherals
4	Paradetech	4966	15,278,350	Display Port, High Speed Signal Interface
5	ESMT	3006	15,268,091	Specialty DRAM, Audio AMP/Power IC
6	EMC	2458	15,099,690	Touch Pad, Touch Screen, PC-Peripheral
7	Raydium	3592	14,425,150	AMOLED and Display Driver IC
8	Silergy	6415	13,936,157	Power Management IC
9	Sitronix	8016	13,804,562	Display Driver IC
10	Focaltech	3545	13,800,348	Touch Panel Control IC, LCD Driver IC

No. 2

3~80W

Middle AMP Supplier in the world

TV

No. 1 Amp Supplier
for Global TV in 2020

Home Audio

Leader in China AI
Speaker Market in 2020

Product

■ Audio

- Audio Amp. – 5V
 - Class D/K
- Audio Amp. – 12/24V
 - Class D: Analog input
 - Class D: Digital input
 - Class D: PWM input
- USB Audio
- Audio ADC / DAC
- Line Driver

■ Power

- Linear Regulator (LDO)
- DC/DC Switching Converter
 - Step-Up / Boost
 - Step-Down / Buck
- LED Driver
 - Back Light
- Li-Ion Battery Charger

Audio

5V Class D/K Audio Amp - Mono



	AD51652	AD51653
Class	D	K
Channel	1	1
Supply	2.5~5.5V	2.8~5.5V
Iquiescent	3mA (5V)	3.5mA (3.6V)
Load (typical)	4Ω	4Ω
Output Power (10%)	3.2W (5V, 4Ω)	4.2W (5V, 4Ω)
		2.9W (4.2V, 8Ω)
THD+N	10%	10%
Power Limit (NCN)	X	X
PSRR (dB)	-77dB (217Hz)	-80dB(217Hz) -75dB(1KHz)
SNR (dB)	102dB (5V/1.8W/4ohm)	95dB (3.6V/1W/8ohm)
Efficiency	93% (5V/1.78W/8ohm)	78% (3.6V/1W/8ohm) 73% (3.6V/2W/8ohm)
Earphone	X	X
Package	MSOP-8 TDFN-8 WCSP	TSSOP-14 QFN-3x3-20
P2P	TPA2010/2011 EMA2011	NCP2830

- BT Speaker
- Mobile Phone
- Portable Media Device
- Navigator
- Voice Control Module



5V Class D Audio Amp - Stereo



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	AD52010	AD52080	AD52651C	AD52652	AD52655	AD52656
Channel	2	2	2	2	2	2
Supply	5V	5V	5V	5V	5V	5V
Load (typical)	4Ω	4Ω	4Ω	4Ω	4Ω	4Ω
Output Power	3W	3W	3W	3W	2.5W Power Limit	2.5W Power Limit
THD+N	10%	10%	10%	10%	1%	1%
AGC	X	O	X	X	O	O
PSRR (dB)	77	70	55	66	55	55
SNR (dB)	98	90	96	96	96	96
Efficiency	90%	95%	91%	91%	91%	91%
Earphone	X	O	X	O	X	O
P2P / Note	High C/P	APA2604C	PAM8603M	PAM8603A/E PAM8007	PAM8603M	PAM8603M

Analog-in Class D Audio Amp

- Super Low EMI/EMC (Spread Spectrum™)
- True Filter-less, 省電感, available for <13PVDD



	AD52580	AD52060	AD52050B
Channel	2 / 1	2 / 1	2
Supply	8~26V	8~26V	8~14.4V
Output Power	5~20W*2 10~40W*1	5~20W*2 10~40W*1	15W*2
True Filter-less Save 4 inductors	X	O	O
SNR (dB)	98	103	100
PSRR (dB)	62	70	70
Efficiency	87%	93%	92%
Pin-to-Pin	TPA3110	TPA3110	TPA3136
Pin Assignment			

■ For Audio Application

	AD51050B	AD52058	AD52117/AD52068	AD52090	AD52070	AD53060
Channel	1	2 / 1	2 / 1	2 / 1	2 / 1	2 / 2.1 / 4
Supply	4.5~14.4V	4.5~14.4V	4.5~26V	4.5~26V	4.5~26V	4.5~20V
Output Power	3~8W*1	3~15W*2 6~30W*1	3~20W*2 6~40W*1	3~30W*2 6~60W*1	3~30W*2 6~60W*1	25W*2 15W*2+25W 15W*4
True Filter-less <13PVDD	O	O	O	O	- AGC(no distortion) - AM Avoidance - Switch PWM Freq - Low Idle Current - Master/Slave sync	O
SNR (dB)	100	103	103	103		103
PSRR (dB)	70	70	70	70		70
Efficiency	93%	93%	93%	96%		88%
Pin-to-Pin		TPA3136/8/3110	TPA3110	TPA3110		

Battery Charged		AD52067
Channel		2 / 1
Supply		2.9~12V
Built-in Step-up Converter		up to 14V
Output Power @12V boosted from 8.4V (2 cell battery)	Stereo	13W/CH, 4Ω, 1% 15W/CH, 4Ω, 10%
	Mono	19W/CH, 4Ω, 10%
Output Power @8V boosted from 3.7V (1 cell battery)	Stereo	6W/CH, 4Ω, 1% 7.5W/CH, 4Ω, 10%
	Mono	8.7W/CH, 4Ω, 10%

Digital-in D Amp: No EQ (with DRC)



For TV Application

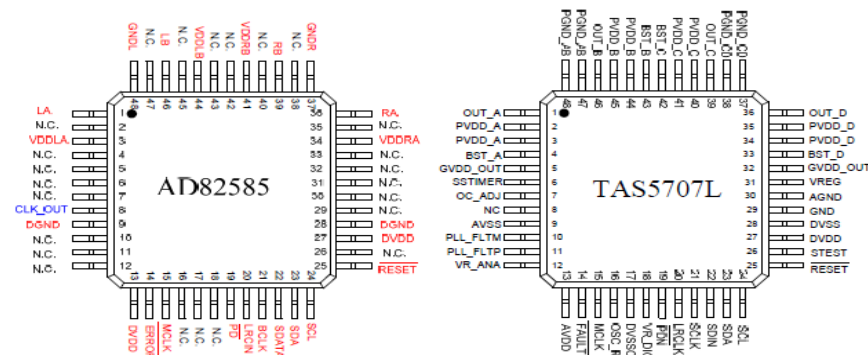
ESMT	TI P2P	Note
AD82587D	X	5~20Wx2, no EQ, 1 DRC, 24pin
AD82010/AD87010	X	5~20Wx2, no EQ, 1 DRC. Spread Spectrum/Filter Free(<13V) Closed Loop, MCLK-less, High-Res; + Headphone
AD82111	X	5~25Wx2, no EQ, 1 DRC, Spread Spectrum, Closed Loop, 32-bit I2S, I2Sout, P2P AD82088-24

For Audio Application

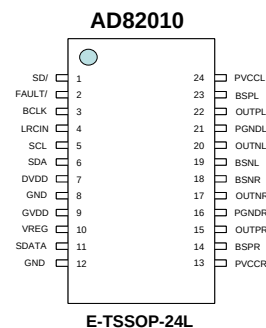
AD82583	X	3~20Wx2, no EQ, HW control, support LV(5V), Closed Loop
AD82010	X	3~20Wx2/40Wx1, no EQ, support LV(4.5V), Spread Spectrum, Closed Loop
AD82111	X	5~25Wx2, no EQ, 1 DRC, Spread Spectrum, Closed Loop, 32-bit I2S, I2Sout, 1.8/3.3V I/O Support, MCLK Output(AD82111-28)

TI P2P

Pin 8: CLK_OUT (AD82585) and N.C (TAS5707L)

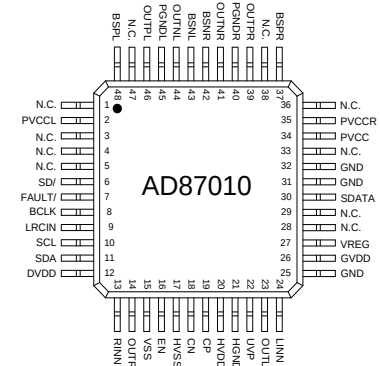


24Pin



+ Headphone =
(2Vrms Line Driver)

+HP

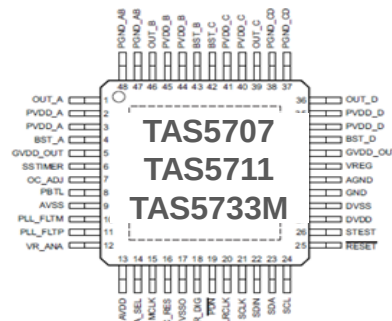
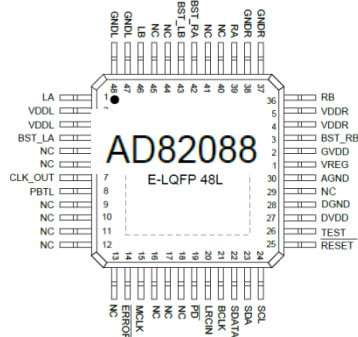


Digital-in D Amp: With EQ (with DRC)

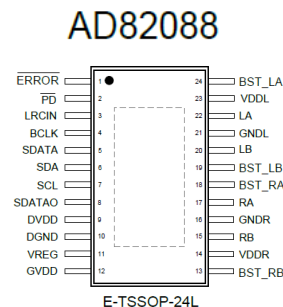
For TV Application

ESMT	TI P2P	Note
AD82088/AD87088	TAS5707/5711/ 5733M	5~20Wx2, 30 EQ, 3 DRC, I2S output; + Headphone
AD82120/AD87120	TAS5805	5~25Wx2, 32 EQ, 3+post DRC Closed Loop, Spread Spectrum, 3D Surround, I2S output + Headphone

TI P2P

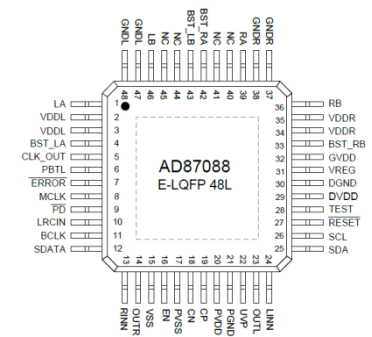


24Pin



+ Headphone =
(2Vrms Line Driver)

+HP

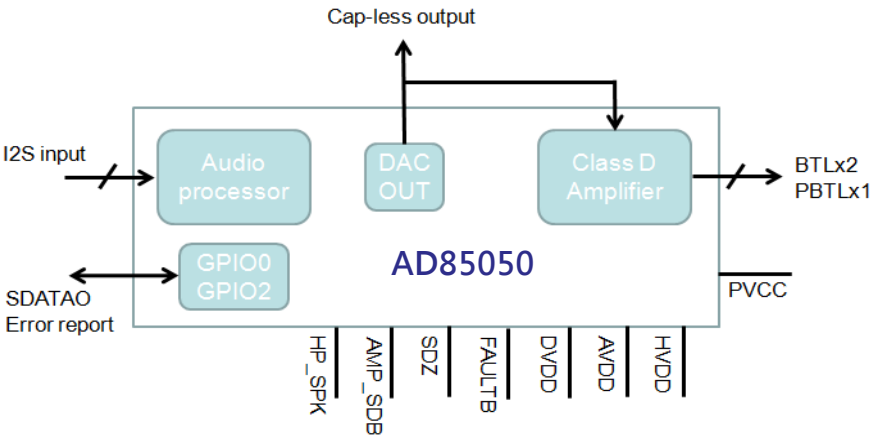


For Audio Application

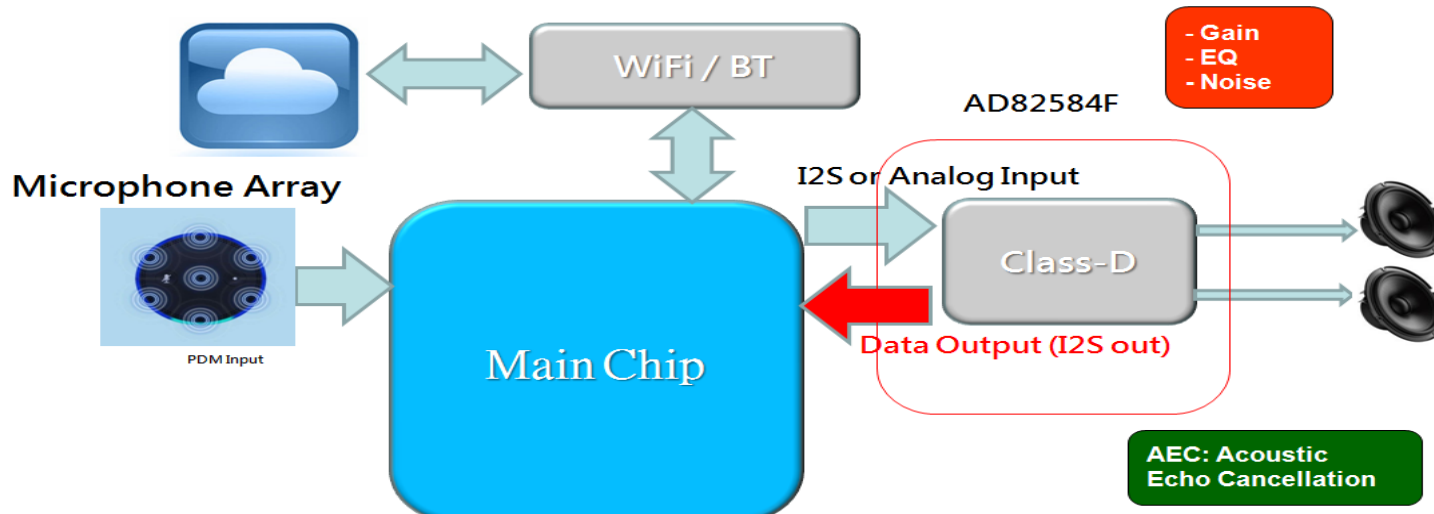
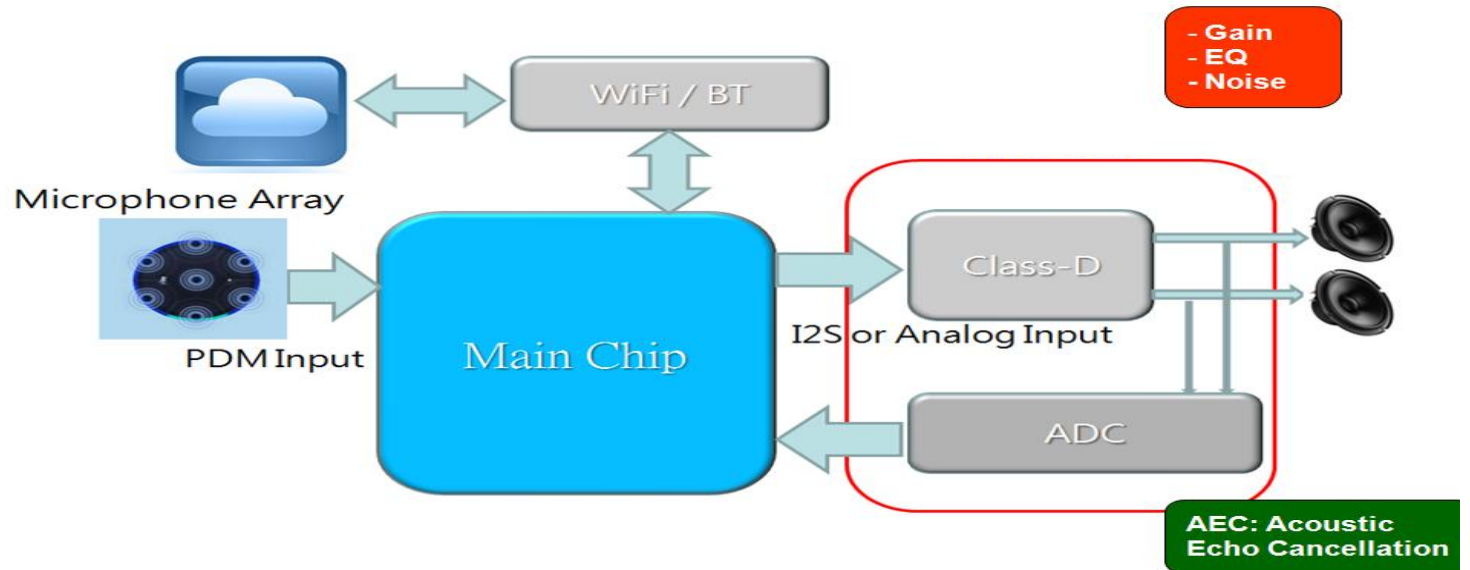
ESMT	TI P2P	Note
AD82584F	TAS5707/5711	5~25Wx2, 30 EQ, 3+post DRC, I2S out, 8KHz~192KHz, 3D ,4.5~26V
AD85050	X	5~30Wx2, 36 EQ, 3+post DRC, I2S out, Closed Loop, 4.5~26V
AD82128/01	TAS5805	5~25Wx2, 32 EQ, 3+post DRC, 1.8 I/O Support Closed Loop, Spread Spectrum, 3D Surround, I2S output
AD82129	X	5~25Wx2, 32 EQ, 3+post DRC, 1.8/3.3V I/O Support, MCLK Output Closed Loop, Spread Spectrum, 3D Surround, I2S output

- Closed-Loop
- Loopback for AEC: I2S out & DAC out
- Sound processing:
 - 36EQ, 3DRC+Post DRC
 - Programmed 3D surround sound
 - Virtual Bass/Exciter
- 3.3/1.8V for digital I/O

2Vrms Line Driver

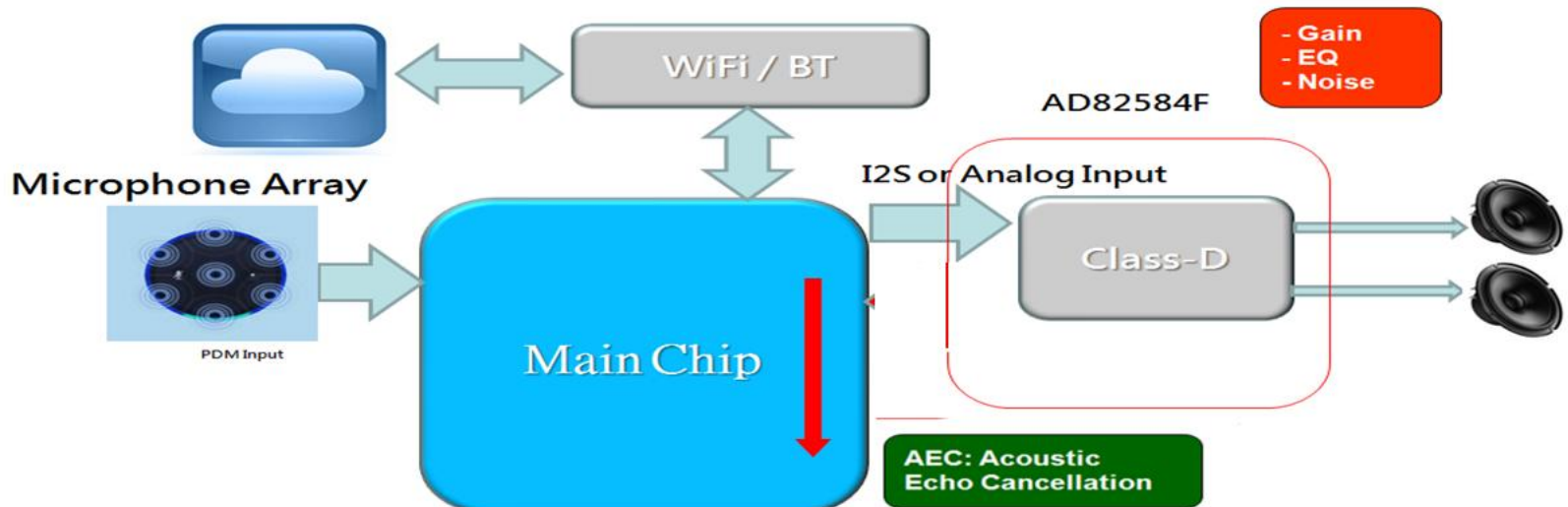


AI Speaker AEC



AI Speaker AEC – Software Path

■ Internal DSP

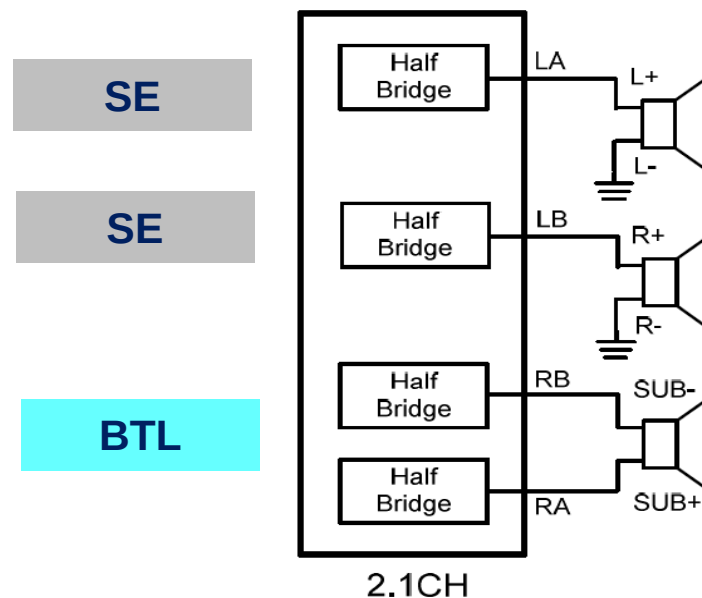
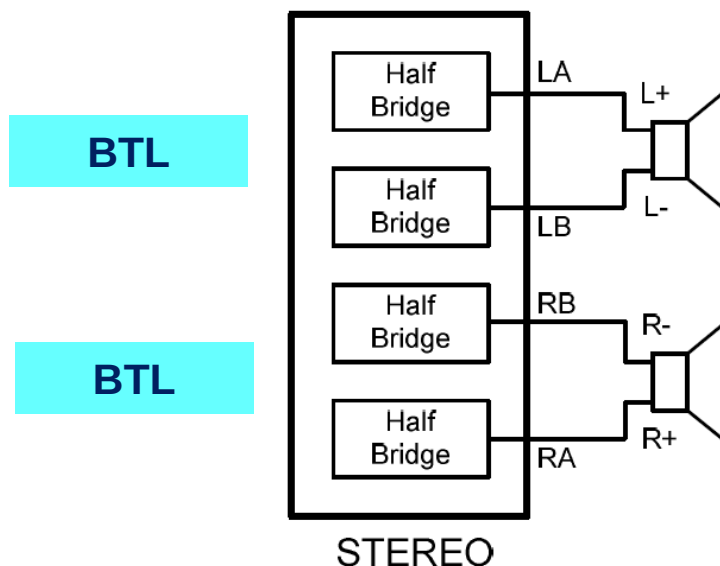


Digital-in D Amp: 2.1 Channel

ESMT	TI	Note
AD83584D	5711	10Wx2 + 20W, 2SE + 1 BTL (2BTL)
AD83586B	X	20Wx2 + 40W, 2BTL + 1PBTL (4BTL)

TPA5711/AD83584D
in 2.0 model (20W*2)

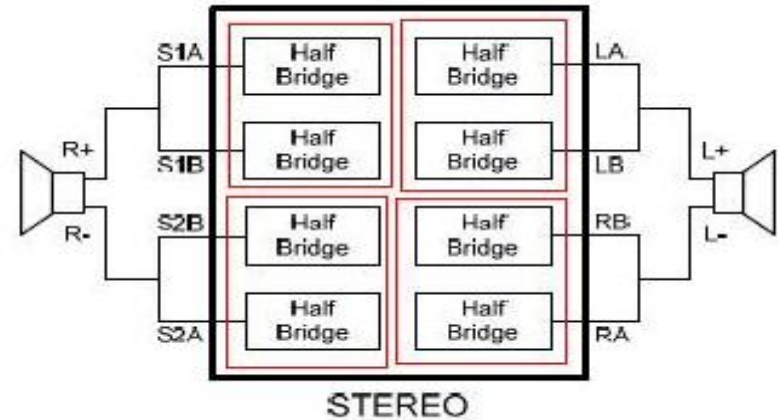
TPA5711/AD83584D
in 2.1 model (10W*2+20W)



AD83586B – 4 BTL

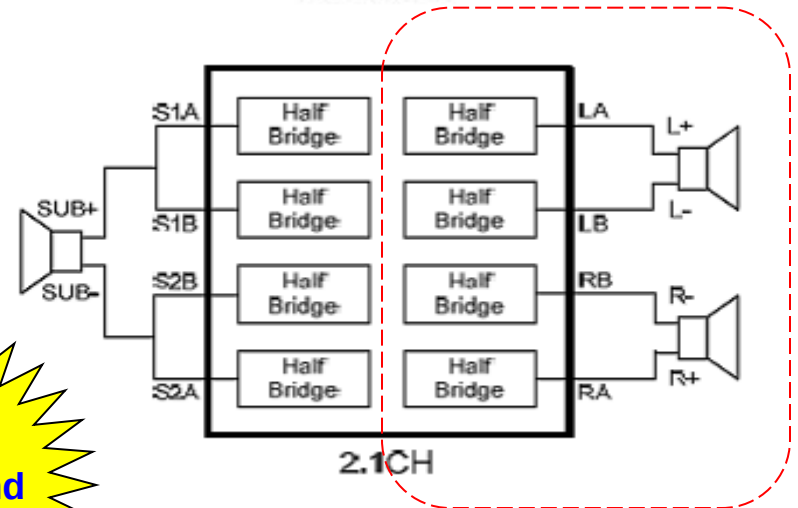
- 2.0CH Mode: 40W x 2CH

supports 8, 6, 4Ω (BTL mode)
vs. TI 5711's 8Ω only



- 2.1CH Mode: 20W x 2CH + 40W

L/R output are both BTL
vs. TI L/R **SE** only



- Mono Mode: 80W



DAC/ADC

DAC

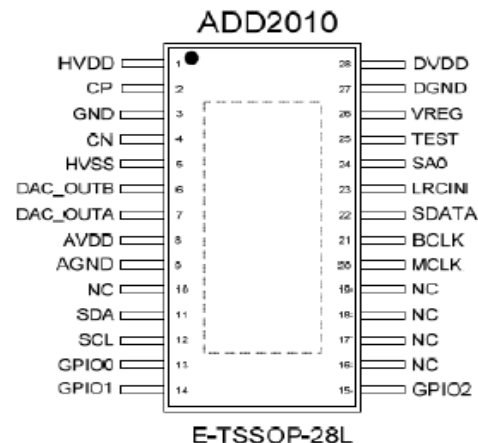
Product	Data Output	Power Supply	Sampling Freq	Feature
ADD2010	24bit	1.8 / 3.3V	8~192K	- 36 EQ, 3 band DRC, Volume control - 2Vrms Line out

ADC

Product	Data Output	Power Supply	Sampling Freq	Feature
AD12250A	24bit	3.3V	8~96K	- Power Down function

24 bits Audio Stereo DAC with DRC and EQ, 2Vrms Line Out

- Multiple sampling frequencies (Fs)
8kHz and 32kHz / 44.1kHz / 48kHz and
64kHz / 88.2kHz / 96kHz and
128kHz / 176.4kHz / 192kHz
- Sound processing including:
36Bands EQ & 3DRC+Post DRC
Programmed 3D surround sound
Virtual Bass/Exciter
- Line driver maximum Output Swing into 10k Ω
2Vrms at 3.3V Supply Voltage
- Headphone Output Power
25mWx2ch into 32 Ω @ 0.1% THD+N
- I2S output with selectable audio DSP point



USB Audio

Product	CH	VDD (V)	Load	Power (W)	Recording	Package	Features
AD62556	2	5	na	na	O	LQFP-48	Mic/Line in Headphone
AD62557	2	5	4	2.6	O	LQFP-48	D Amp, I2S in/out Mic/Line in

Line Driver

Product	Operation Voltage (V)	Max Output	Feature	Package	Pin-to-Pin
AD22650	3.0~5.5V	3 Vrms	Popless Differential input	TSSOP-14	TI DRV602/603
AD22654	3.0~5.5V	3 Vrms	Popless Single-ended input	MSOP-10	
AD22653B	3.0~3.6V	2 Vrms	Popless Differential input	TSSOP-14	TI DRV632
AD22657B	3.0~3.6V	2 Vrms	Popless Single-ended input	MSOP-10	

Power IC

AEC-Q100 Line Card

AEC Products	LDO	
P/N	EMP8130	EMP8045
Vin	1.7V~5.5V	3.0V~32V
Freq(MHZ)	-	-
Iout (A)	0.3	0.15
Feature	Ultra High PSRR Small Package	HV, Low Iq, Vo_1.5%
Package	DFN1x1	E-SOP-8
AEC-Q100 Grade	1	1

LDO Line Card

	Standard LDO	Very Low Drop LDO		Ultra Low-Iq LDO	Ultra High-PSRR LDO	High Current LDO				HV LDO
Product	EMP8021	EMP8965	EMP8966	EMP8150	EMP8130	EMP8110	EMP8161/A EMP8166/A	EMP8160/A EMP8165/A	EMP8170/A EMP8175/A	EMP804XB series
Vin	2.2V~5.5V	2.5V~5.5V	2.5V~5.5V	1.2V~5.5V	1.7V~5.5V	2.5V~6.5V	1V~5.5V	1V~5.5V	1V~5.5V	3.0V~40V 3.0V~20V
Iout	600mA	600mA	600mA	250mA	300mA	1.5A	1A	2A	3A	150mA
Feature		Very Low Drop	ADJ	Iq=1uA , High PSRR Small Package	Ultra High PSRR Small Package	High Current Power Good	High Current Low Dropout	High Current Low Dropout	High Current Low Dropout	HV, Low Iq, Vo_1%(B)
Package	SOT23-5 TDFN-6 SOT89-3	SOT23-5 TDFN-6	SOT23-5 SOT23-6	SOT23-5 SOT23-3 uDFN1X1	SOT23-5 uDFN1x1 SOT23-3 TDFN2X2-6	SOT223 SOP8-E	SOT23-6 SOP8-E	SOP8-E	SOP8-E	SOT23-3 SOT23-5 SOT89-3

Buck Converter Line Card (5V)

Product	EML3380/3	EML3320	EML3321	EML3322
Vin	2.5V~5.5V	2.7V~5.5V	2.7V~5.5V	2.7V~5.5V
Iout (A)	1.0	2	3.0	2.0/2.0
Control	Sync. PWM PSM	Sync. PWM PSM	Sync. PWM PSM	Sync. PWM PSM
Package	SOT-23-5 TDFN-2x2-6	SOT-23-5 SOT-23-6	TDFN-2x2-8	TDFN-3x3-10

P2P RT8010
P2P AP3417C
P2P SY8088

Buck Converter Line Card (HV)

	High Voltage		
Product	EML3290	EML3420 EML3421	EML3350
Vin	4.5V~40V	4.5V~40V	4.5V~60V
Iout (A)	3	6A	1.5A
Control	Sync. PSM PWM Adj. Freq. OVP	Non-Sync. 2.1MHz Iq=180uA	Non-Sync. 1.5MHz
Package	SOP-8-E	SOP-8-E	SOP-8-E

P2P TPS54540

Boost Converter Line Card

	5V	
Product	EMH7070	EMH7090
Vin	2.6V~5.5V	2.9V~12V
Current Limit (A)	2.5	6.0
Control	Async PWM	Async PWM
Package	SOT-23-6	SOP-8-E

Battery Charger Line Card

	Linear Charger	
Product	EMC5754 EMC5755	EMC5040 EMC5042
AMR (V)	6	13.5 15
Vbat (V)	4.2/4.35 ± 1%	4.2/8.4 ± 1%
Iout (A)	1.0 1.2	1.2
Features	TR	TR Temp Sense OVP
Package	SOT-23-5 SOP-8-E TDFN-3x3-6	TDFN-3x3-10 SOP-8-E

DC/DC LED Driver Line Card (Back Light)

	LED Driver (Back Light)				
Product	EMD3001	EMD2050	EMD2055	EMD2095	EMD2240
Topology	Charge Pump	Boost	Boost	Boost	Step-Down
Vin	2.7V~4.5V	2.5V~5.5V	2.5V~5.5V	2.5V~5.5V	6~60V
OVP (V)	-----	15	36	31	*
Max Iout/Ch.	100mA	*	*	*	1A
Dimm	PWM	PWM	PWM	PWM	PWM
Features		3S13P	10s3p	8s3p	*
Package	SOT-23-6 TDFN-2x2-6	SOT-23-6	SOT-23-6 TDFN-2x2-8	SOT-23-6	SOT-23-5

Thank you

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